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10/823,196	04/12/2004	Kiran Kumar Kuchi	875.0132.U1(US)	4038

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EXAMINER	
NGUYEN, LEON VIET Q	
ART UNIT	**PAPER NUMBER**
2611	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/823,196	KUCHI ET AL.	
	Examiner	Art Unit	
	Leon-Viet Q. Nguyen	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 20-24* is/are rejected.

7)☐ Claim(s) *18 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/6/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 9/6/2005 was filed after the mailing date of 9/6/2005. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 8-11 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onggosanusi et al (US20040192215) and further in view of Arslan et al (US20050105646).

Re claim 1, Onggosanusi teaches a method of receiving a wireless communication having at least two signals selected from the group comprising GMSK signals and 8PSK signals (¶0030, it is well known in the art that GSM-EDGE networks receive both GMSK and 8PSK modulated signals), comprising the steps of:

Receiving the incoming signals (block 505 in fig. 5, ¶0042);

Rotating the raw incoming signals in complex space with a factor such that the GMSK signal is binary modulated (block 510 in fig. 5, ¶0044) ;

Detecting the rotated signal as two signal streams composed of real (I) and imaginary (Q) signals in a detector (block 515 in fig. 5, ¶0044); and

Processing the I and Q signal streams with a filter (block 520 in fig. 5, ¶0046).

However Onggosanusi fails to teach wherein the filter is a MIMO filter and processing the output of the MIMO filter with a joint reduced state sequence estimator based on the filtered channel impulse response. Arslan teaches wherein a filter is a MIMO filter (¶0004, the pre-filter is interpreted to be a MIMO filter) and processing the output of the MIMO filter with a joint reduced state sequence estimator (¶0004, using an equalization technique such as RSSE) based on the filtered channel impulse response (¶0004, the pre-filter shortens the channel impulse response taps which allows the use of the equalization technique).

Therefore taking the combined teachings of Onggosanusi and Arslan as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the filtering and equalization of Arslan into the method of Onggosanusi. The motivation to combine Arslan and Onggosanusi would be to compensate for the effects of multipath fading and co-channel interference (¶0002).

Re claim 2, the modified invention of Onggosanusi teaches a method in which the desired signal is an 8PSK signal (¶0043 in Onggosanusi, it is well known in the art

that 8PSK is merely a variation of BPSK); a set of 8PSK training symbols are rotated by $e^{j(\theta k-\Phi k)}$ (¶0044 in Onggosanusi, the factor $(-j)^{m+1}$ is interpreted to be a variation of $e^{j(\theta k-\Phi k)}$); and

channel estimation parameters are found by one of a maximal likelihood (¶0002 in Arslan, the equalizer using an MLSE technique), or a least minimum mean square error estimation procedure.

Re claim 3, although not explicitly stated, one of ordinary skill in the art would have realized that the 8PSK signal would interfere with the GMSK signal in claim 1.

Re claim 4, although not explicitly stated, one of ordinary skill in the art would have realized that the GMSK signal would interfere with the 8PSK signal in claim 1.

Re claim 8 Onggosanusi teaches a method of sending a wireless communication comprising the steps of:

having at least two signals selected from the group comprising GMSK signals and 8PSK signals (¶0030, it is well known in the art that GSM-EDGE networks receive both GMSK and 8PSK modulated signals), comprising the steps of:

Receiving the incoming signals (block 505 in fig. 5, ¶0042);

Rotating the raw incoming signals in complex space with a factor such that the GMSK signal is binary modulated (block 510 in fig. 5, ¶0044) ;

Detecting the rotated signal as two signal streams composed of real (I) and imaginary (Q) signals in a detector (block 515 in fig. 5, ¶0044); and

Processing the I and Q signal streams with a filter (block 520 in fig. 5, ¶0046).

However Onggosanusi fails to teach wherein the signals are transmitted on a channel from two or more spatially separated antennas, the filter is a MIMO filter and processing the output of the MIMO filter with a joint reduced state sequence estimator based on the filtered channel impulse response. Arslan teaches a MIMO channel model with a plurality of antennas (fig. 2), wherein a filter is a MIMO filter (¶0004, the pre-filter is interpreted to be a MIMO filter) and processing the output of the MIMO filter with a joint reduced state sequence estimator (¶0004, using an equalization technique such as RSSE) based on the filtered channel impulse response (¶0004, the pre-filter shortens the channel impulse response taps which allows the use of the equalization technique).

Therefore taking the combined teachings of Onggosanusi and Arslan as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the MIMO system, filtering and equalization of Arslan into the method of Onggosanusi. The motivation to combine Arslan and Onggosanusi would be to compensate for the effects of multipath fading and co-channel interference (¶0002).

Re claim 9, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 5. The first signal is interpreted to be the same as the interfering signal in claim 5.

Re claim 10, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 6. The second signal is interpreted to be the desired signal in claim 6.

Re claim 11, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 7. The second signal is interpreted to be the desired signal in claim 7.

Re claim 20, Onggosanusi teaches a method of receiving a wireless communication comprising M1 GMSK signals, M2 8PSK signals and an additive noise component (¶0030, ¶0045, it is well known in the art that GSM-EDGE networks receive both GMSK and 8PSK modulated signals), comprising the steps of:

Receiving the incoming signals (block 505 in fig. 5, ¶0042);

Rotating the raw incoming signals in complex space with a factor such that the GMSK signal is binary modulated (block 510 in fig. 5, ¶0044) ;

Detecting the rotated signal as two signal streams composed of real (I) and imaginary (Q) signals in a detector (block 515 in fig. 5, ¶0044); and

Processing the I and Q signal streams with a filter (block 520 in fig. 5, ¶0046).

However Onggosanusi fails to teach wherein the filter is a MIMO filter and processing the output of the MIMO filter with a joint reduced state sequence estimator based on the filtered channel impulse response. Arslan teaches wherein a filter is a MIMO filter (¶0004, the pre-filter is interpreted to be a MIMO filter) and processing the output of the MIMO filter with a joint reduced state sequence estimator (¶0004, using an equalization technique such as RSSE) based on the filtered channel impulse response (¶0004, the pre-filter shortens the channel impulse response taps which allows the use of the equalization technique).

Therefore taking the combined teachings of Onggosanusi and Arslan as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the filtering and equalization of Arslan into the method of Onggosanusi. The motivation to combine Arslan and Onggosanusi would be to compensate for the effects of multipath fading and co-channel interference (¶0002).

3. Claims 5-7 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onggosanusi et al (US20040192215) and Arslan et al (US20050105646) and further in view of Olsson et al (US20050111596).

Re claim 5, the modified invention of Onggosanusi teaches a method in which channel estimation parameters are found by one of a least squares or a least minimum mean square error estimation procedure (¶0046 in Onggosanusi, the MLSE equalizer

used for channel estimation) but fails to teach a method in which the interfering signal is an 8PSK signal; a set of interfering 8PSK training symbols are rotated by $e^{j(\theta k-\Phi k)}$.

However Olsson teaches a method in which the interfering signal is an 8PSK Signal (¶0043, the interferer is 8PSK modulated); a set of interfering 8PSK training symbols are rotated by $e^{j(\theta k-\Phi k)}$ (¶0043, the rotation for the 8PSK-signals is $3\pi/8$ which is interpreted to be a mathematical variation of $e^{j(\theta k-\Phi k)}$).

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the interfering signal of Olsson into the method of Onggosanusi and Arslan. The motivation to combine Olsson, Arslan and Onggosanusi would be to give a smaller residual error (¶0043).

Re claim 6, the modified invention of Onggosanusi teaches a method in which the desired signal is an 8PSK signal (¶0011 in Olsson).

Re claim 7, the modified invention of Onggosanusi teaches a method in which the desired signal is an GMSK signal (¶0011 in Olsson).

Re claim 21, the modified invention of Onggosanusi teaches a method wherein the step of processing comprises blind interference suppression of a GMSK interferer (¶0102 in Onggosanusi, the proposed interference schemes permit a blind implementation) but fails to teach in which M1=0 and M2=1.

Although not explicitly taught, Olsson suggests an EDGE system which receives an 8PSK-modulated signal and no GMSK signal (¶0042).

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the receiving an 8PSK signal of Olsson into the method of Onggosanusi and Arslan. The motivation to combine Olsson, Arslan and Onggosanusi would be deliver a higher raw data-rate, which is well known to one of ordinary skill in the art as a benefit of 8PSK modulation.

Re claim 22, the modified invention of Onggosanusi teaches a method wherein the step of processing comprises joint detection of one GMSK and one 8PSK signal (¶0003 in Arslan, a receiver performs joint detection on co-channel signals) but fails to teach in which M1=1 and M2=1.

However Olsson teaches a receiver in which a desired signal is GMSK modulated and an interferer signal is 8PSK modulated (¶0028, fig. 14).

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the receiving of GMSK and 8PSK signals of Olsson into the method of Onggosanusi and Arslan. The motivation to combine Olsson, Arslan and Onggosanusi would be to eliminate the degradation in 8PSK-modulated interference (¶0063).

Re claim 23, the modified invention of Onggosanusi teaches a method wherein the step of processing comprises joint detection of two 8PSK signals with suppression of GMSK interference (¶0003 in Arslan, a receiver performs joint detection on co-channel signals) through I-Q whitening (block 525 in fig. 5 of Onggosanusi), but fails to teach in which M1=2 and M2=0.

Although not explicitly taught, Olsson suggests an EDGE system which receives 8PSK-modulated signals and no GMSK signal (¶0042). One of ordinary skill in the art would have found it obvious to received two 8PSK signals.

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the receiving two GMSK signals of Olsson into the method of Onggosanusi and Arslan. The motivation to combine Olsson, Arslan and Onggosanusi would be deliver a higher raw data-rate, which is well known to one of ordinary skill in the art as a benefit of 8PSK modulation.

Re claim 24, the modified invention of Onggosanusi teaches a method wherein the step of processing comprises joint detection of two GMSK signals with suppression of GMSK interference (¶0003 in Arslan, a receiver performs joint detection on co-channel signals) through I-Q whitening (block 525 in fig. 5 of Onggosanusi), but fails to teach in which M1=2 and M2=0.

However Olsson teaches a receiver in which a desired signal is GMSK modulated and an interferer signal is GMSK modulated (¶0027, fig. 13).

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the receiving two GMSK signals of Olsson into the method of Onggosanusi and Arslan. The motivation to combine Olsson, Arslan and Onggosanusi would be to give a large gain over a conventional receiver (¶0063).

4. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arslan et al (US20050105646) and further in view of Onggosanusi et al (US20040192215).

Claim 12 is being treated under 35 U.S.C. § 112, 6th ¶ because of the following 3-prong analysis:

- Phrase "means for" or "step for" are used in the claim;
- "means for" or "step for" is modified by functional language; and
- "means for" or "step for" is not modified by sufficient structure, material or acts for achieving the specified function.

Re claim 12, Arslan teaches a wireless transmission system comprising:

At least one base station having at least two spatially separated antennas (base station 102 and 104 in fig. 1) and at least one RF unit (it is well known in the art that a base station has a transmitter) for transmitting one of a GMSK and an 8PSK transmission signal along each of said two spatially separated antennas (¶0017. Although not explicitly taught, the wireless terminal may include GSM and EDGE protocols and it was well known that the GSM/EDGE protocol is a combination of GSM and EDGE);

At least one receiving station (wireless terminal 100 in fig. 1), having a single antenna (antenna 152 in fig. 1), for communicating with said base station; in which
Said receiving station has processor means for applying interference cancellation to a composite input signal comprising a combination of a first signal and a second signal interfering with said first signal (see the previously rejected claim 1), thereby reducing interference between said first signal and said second signal.

Therefore taking the combined teachings of Arslan and Onggosanusi as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the interference cancellation receiver of Onggosanusi into the communication system of Arslan. The motivation to combine Arslan and Onggosanusi would be to eliminate interference in a received signal (¶0009).

Re claim 13, the modified invention of Arslan teaches a system in which said base station transmits two transmission signals on the same channel (it is well known in the art that in GSM communications, multiple signals are sent over the same channel).

5. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arslan et al (US20050105646) and Onggosanusi et al (US20040192215) and further in view of Olsson et al (US20050111596).

Claim 17 is being treated under 35 U.S.C. § 112, 6th ¶ because of the following 3-prong analysis:

- Phrase "means for" or "step for" are used in the claim;
- "means for" or "step for" is modified by functional language; and
- "means for" or "step for" is not modified by sufficient structure, material or acts for achieving the specified function.

Re claim 14, the modified invention of Arslan fails to teach a system in which said two transmissions signals comprise two GMSK signals. However Olsson teaches a receiver in which a desired signal is GMSK modulated and an interferer signal is GMSK modulated (¶0027, fig. 13). The desired and interferer signals are interpreted to be the transmission signals.

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the receiving two GMSK signals of Olsson into the communication system of Onggosanusi and Arslan. The motivation to combine Olsson, Arslan and Onggosanusi would be to give a large gain over a conventional receiver (¶0063).

Re claim 15, the modified invention of Arslan fails to teach a system in which said two transmissions signals comprise two 8PSK signals. However, although not explicitly taught, Olsson suggests an EDGE system which receives 8PSK-modulated signals and no GMSK signal (¶0042). One of ordinary skill in the art would have found it obvious to received two 8PSK signals.

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the receiving two GMSK signals of Olsson into the method of Onggosanusi and Arslan. The motivation to

combine Olsson, Arslan and Onggosanusi would be deliver a higher raw data-rate, which is well known to one of ordinary skill in the art as a benefit of 8PSK modulation.

Re claim 16, the modified invention of Arslan fails to teach a system in which said two transmissions signals comprise one 8PSK signal and one GMSK signal. However Olsson teaches a receiver in which a desired signal is GMSK modulated and an interferer signal is 8PSK modulated (¶0028, fig. 14).

Therefore taking the modified teachings of Onggosanusi and Arslan with the teachings of Olsson as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the receiving of GMSK and 8PSK signals of Olsson into the method of Onggosanusi and Arslan. The motivation to combine Olsson, Arslan and Onggosanusi would be to eliminate the degradation in 8PSK-modulated interference (¶0063).

Re claim 17, the modified invention of Arslan teaches a system according in which said receiving station comprises means for evaluating the modulation type of an interfering signal and for estimating channel parameters of said interfering signal (see the previously rejected claim 5).

Allowable Subject Matter

6. Claims 18-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of

the base claim and any intervening claims. The allowable subject matter in claim 18 pertains to calculating channel parameters for all combinations of a desired signal. The allowable subject matter in claim 19 pertains to detecting whether said system is in a first or second transmission mode.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon-Viet Q. Nguyen whose telephone number is 571-270-1185. The examiner can normally be reached on monday-friday, alternate friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Nguyen/

DAVID C. PAYNE
SUPERVISORY PATENT EXAMINER